CRATERELLUS, CANTHARELLUS AND RELATED GENERA IN NORTH CAROLINA; WITH A KEY TO THE GENERA OF GILL FUNGI*

By W. C. Coker

Key to the Genera of Agaricaceæ or Gill Fungi

A. Spores white or yellowish (except in forms of *Pleurotus sapidus* where they are lilac, in certain species of *Craterellus* and *Cantharellus* and *Tricholoma* where they are pinkish, and in *Lepiota Morgani* where they are greenish.. 1

1. Plants fleshy, soft, usually soon decaying; if dried not reviving well when moistened. (Some of the smaller species of *Collybia* approach very closely to *Marasmius* in texture and revive when moistened) 2

1. Plants leathery and toughish, pliable; if somewhat fleshy, then reviving and assuming their original shape when moistened after drying 16

1. Plant corky or woody, firm, laterally sessile on wood (shelving); cap hairy, concentrically zonate (placed under the *Polyporaceæ*, which are to be treated later)..............................*Lenzites*

2. Plant growing on decaying mushrooms (*Russula*); gills thick with broad, blunt margins, or not rarely aborted.............*Nyctalis*

2. Plant growing on decaying leaves of rhododendron, very minute (less than 1 cm. high and 1 mm. broad), gills aborted or few and distant, hymenium dissolving...............................*Eomycenella*

2. Plant not as above (if growing on other mushrooms the gills are not as in Nyctalis).. 3

3. Spore-bearing surface (hymenium) smooth or obscurely veined towards the margin of the cap; plant funnel-shaped or with a spreading cap (in *C. Cantharellus* the spore surface is intermediate between this and the next genus).....................*Craterellus*

3. Hymenium composed of more or less gill-like plates or veins, but their margins blunt and anastomosing or branching; spores buff or ochraceous or pinkish.............................*Cantharellus*

3. Hymenium composed of distinct gills, which are not fold-like or vein-like. (If the gills are thick with rather blunt margins, as in species of *Laccaria* and *Hygrophorus*, they do not anastomose freely and the spores are white)... 4

4. Plants exuding a milky or colored juice when broken; flesh of cap composed in large part of globular cells and usually rather fragile. (The steam of some species of *Mycena* exudes a watery or colored juice, but the flesh is not composed of globular cells, and the plants are small and slender)..............................*Lactarius*

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*The colored plate was painted by my niece, Dorothy Coker. The spore plate was mostly drawn by Miss Alma Holland. The photographs are by me and except where indicated are natural size as is also the colored plate.

4. Plants not exuding a juice (except from the stems of certain species of *Mycena*) 5
5. Plants usually quite brittle, the flesh composed of globular cells; spores white, creamy or yellowish, mostly spherical and marked with spicules, warts, or ridges (rarely smooth)............*Russula*
5. Plants not as above in all respects.................................. 6
6. Gills waxy and semi-translucent in appearance, usually thick and broadening towards the cap, the entire plant soft and usually fragile (The gills of *Laccaria* approach these in appearance, but the plants are tougher and less brittle)..................*Hygrophorus*
6. Gills not as above, or if nearly so then the plant tough and firm..... 7
7. Stem none, or, if present, not in the center of the cap (rare exceptions); plants mostly growing on wood.................*Pleurotus*
7. Stem central or nearly so.. 8
8. Stem easily separating from the cap, both stem and cap fleshy; gills free or nearly so... 9
8. Stem continuous with the cap, not easily separating.................10
9. Stem at base furnished with the remains of a volva, such as a cup or rings or warts or scales or meal (in a few species where these are regularly or at times absent the stem is distinctly bulbous); veil present and usually forming a ring on the stem; gills free or nearly so ....*Amanita*
9. Stem and gills as above, but veil (and ring) absent......*Amanitopsis*
9. Veil present and gills free or nearly so, but stem without remains of a volva ....*Lepiota*
10. Stem fleshy or fibrous and elastic, of the same texture as the cap....11
10. Stem cartilaginous, of a different texture from the cap..............14
11. Stem with a veil (and ring); volva wanting; plants densely clustered and growing from stumps or roots......................*Armillaria*
11. Stem without a veil or volva.......................................12
12. Gills notched at the stem, i. e., attached but not by their whole width, and not decurrent...13
12. Gills decurrent, not sinuate (in a few species the gills are usually not decurrent, and they are sometimes various in this respect in the same plant, as in *C. tumulosa.* In *C. dealbata* they are squarely adnate or even a little notched at the stem as in *Tricholoma*, and in *C. nebularis* they are usually squarely attached)..........*Clitocybe*
13. Gills thick with blunt edges, purplish or pinkish at all ages, but becoming conspicuously dusted by the white spores; stem toughish and fibrous ....*Laccaria*
13. Gills thin, variously colored (if pinkish then turning color when bruised or in age); stem fleshy......................*Tricholoma*
14. Gills decurrent ....*Omphalia*
14. Gills not decurrent, or barely so...................................15
15. Margin of cap inrolled when young........................*Collybia*
15. Margin not inrolled when young, plants small.............*Mycena*

16. Gills split along the edge into two plates which roll outward when dry; plant sessile on wood........................*Schizophyllum*
16. Gills not as above..17
17. Stem easily separating from the cap, central; cap toughish-leathery, thin, reviving to its original shape when moistened after drying, usually small and growing on wood....................*Marasmius*
17. Stem continuous with the cap or none, not separating easily, all growing on wood...18
18. Gills blunt on the margin, fold-like and irregular; plants small, reviving when moistened, small, laterally sessile or hanging......*Trogia*
18. Gills not as above..19
19. Gills toothed on the edge................................*Lentinus*
19. Gills not toothed on the edge...............................*Panus*

B. Spores rosy pink or salmon, or flesh color, or brownish pink or ochraceous pink or pinkish brick-color, or chestnut; and in most species the spores are irregularly angular or warted. In some (as *Claudopus variabilis*) the spore color is exactly intermediate between the typical pinkish color of this section and the ochraceous color of the next. The presence of any pink tint will indicate this group. Veil absent; a volva present only in *Volvaria*.

1. Stem lateral or none; growing on wood................*Claudopus*
1. Stem central 2
2. Stem readily separating from the cap; gills free.................... 3
2. Stem and cap of the same texture and not separating without tearing up; gills attached or almost free................................ 4
3. Stem with a cup-like volva at the base..................*Volvaria*
3. Stem without a volva....................................*Pluteus*
4. Gills sinuate (notched at stem) or almost free, or squarely attached and with a slightly decurrent tooth in some cases (distinctly decurrent only in *Leptonia formosa* var.)........................... 5
4. Gills decurrent 7
5. Stem fleshy to fibrous.................................*Entoloma*
5. Stem with the texture of cartilage................................ 6
6. Margin incurved when young...........................*Leptonia*
6. Margin straight even when young.......................*Nolanea*
7. Stem fleshy to fibrous................................*Clitopilus*
7. Stem with the texture of cartilage........................*Eccilia*

C. Spores ochraceous, or rust color, or rusty-brown or dingy vinaceous-brown; the gills more or less similarly colored at maturity. (Certain species of Russula, a genus placed in the white spored group, have decidedly ochraceous or yellow spores, but these may be distinguished by the fragile-brittle texture due to the globular cells that make up the flesh of the cap.)

1. Gills usually separating with ease from the cap, veined between, usually anastomosing or forking; cap margin always inrolled ....*Paxillus*

1. Gills not as above; veil absent........................*Plicaturella*
1. Gills not as above; veil present.................................. 2
2. Veil composed of cob-web hairs (arachnoid), often invisible in age ....*Cortinarius*
2. Veil not cobwebby.. 3
3. Stem eccentric or none...............................*Crepidotus*
3. Stem central 4
4. Stem with a ring...................................*Pholiota*
4. Stem without a ring.. 5
5. Gills dissolving into a jelly or powder...................*Bolbitius*
5. Gills not as above.. 6
6. Gills free from the stem..............................*Plutcolus*
6. Gills attached to the stem (adnate or adnexed).................. 7
7. Stem fleshy 8
7. Stem cartilaginous 10
8. Gills usually notched at the stem (sinuate)..................... 9
8. Gills squarely attached (adnate) or decurrent...........*Flammula*
9. Cap scaly or fibrous or silky*...........................*Inocybe*
9. Cap smooth, viscid...................................*Hebeloma*
10. Gills decurrent ....*Tuleoria*
[not represented]
10. Gills not decurrent..11
11. Cap margin inrolled when young at least.................*Naucoria*
11. Cap margin straight even when young....................*Galerula*

D. Spores dark-brown or brown with a tint of purple or deep smoky purple (nearly black); usually umber-brown (sepia) or purple-brown in purplish chestnut.

1. Stem easily separating from the cap; ring present.........*Agaricus*
1. Stem not easily separating from the cap......................... 2
2. Veil present; ring present or wanting........................... 3
2. Veil wanting 4
3. Stem with a distinct ring............................*Stropharia*
3. Stem usually without a ring; the veil hanging in tatters from the cap margin or disappearing early. (In *H. lachrymabundum* a ring is often present)...................................*Hypholoma*
4. Stem toughish-cartilaginous, hollow; margin of cap incurved when young ....*Psilocybe*
4. Stem as above or more fragile, hollow; margin of cap straight when young ....*Psathrya*

E. Spores black or nearly so, not purplish (deep smoky olive in *Gomphidius vinicola;* and in a few species of *Corprinus* they are deep brown, as in *Agaricus*, when fresh and moist, but turn almost black on drying).

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*In a few species of Inocybe that are nearly smooth, such as *I. fallax*, the warty spores will distinguish them from Hebeloma.

1. Gills and margin of cap usually resolving into an inky fluid; if not, then the cap very thin and splitting or curling backwards .... *Coprinus*
1. Gills or cap not as above... 2
2. Ring present .... *Anelaria*
2. Ring absent 3
3. Gills distinctly decurrent........................... *Gomphidius*
3. Gills not decurrent... 4
4. Cap membranous, its margin distinctly striate, at least when moist .... *Psathyrella*
4. Cap somewhat fleshy; margin not distinctly furrowed....*Panæolus*

EOMYCENELLA

This genus has been proposed by Dr. Atkinson to contain a wonderfully delicate little plant found by him at Blowing Rock, N. C. His description follows: Atkinson (Bot. Gaz. **34**: 37. 1902).

"Plants stipitate. Pileus companulate to expanded, consisting of a layer of radiating branched threads forming a more or less lattice-like or trabecular, expanded, thin structure; trama wanting or very rudimentary the subhymenium arising directly from the trabeculæ of the pileus. Hymenium plane, or in larger forms with a few short, narrow, distant lamellæ not reaching the stipe; lamellæ with rudimentary trama. Basidia clavate, 4-spored. Spores smooth, 1-celled, hyaline. Stipe fleshy, delicate. At maturity hymenium dissolving, leaving many of the spores lying on an amorphous layer against the trabeculæ.

One species, on decaying leaves of *Rhododendron maximum,* Blowing Rock, N. C."

Eomycenella Echinocephala Atk.

This minute plant is included here because it is known only from North Carolina and because of its scientific interest to the student of mycology. The following description is also by Dr. Atkinson.

"Plants white, 3-8 mm. high. Pileus 0.5-0.75 mm. broad. Stipe 60-80μ in diameter. Plants campanulate to expanded and upturned in age, trabeculæ of upper surface echinulate, bearing here and there globose free branches, 10-15μ in diameter and also echinlate, margin of pileus with free clavate branches in the form of a fringe. Cells of the trabeculæ 25-30 x 6-10μ. Hymenium plane or with few short, narrow gills. Gills when present narrowed at each end, not reaching the stipe. In the plant observed, 8 to 10 long lamellæ, 4 to 6 intermediate ones much shorter. Subhymenium loosely branched, obovate cells arising from the trabeculæ and terminating in the basidia, or in the forms with lamellæ arising from a rudimentary trama in the lamella. Basidia short clavate, abruptly narrowed into a pedicel, 9-12 x 6-9μ, 4-spored. Spores obovate-oblong, elliptical, proximal end pointed, 6-8 x 3-4 *u*, hyaline, smooth, granular. Stipe thread-like, with scattered hairs bearing a short echinulate cell on the end. Base of stipe only slightly broadened.

Eomycenella is related to Discocyphella[2] P. Hennings, but differs in the dissolving hymenium and the fact that the pileus is not gelatinous nor the stem horny. From Cymetella[3] Patouillard (placed with Agaricaceæ) it differs in the trabecular pileus and the dissolving hymenium; and from Glœocephala[4] (Clarvariaceæ) Massee, which has one-spored basidia. The latter should be placed in the Thelephoraceæ."

TROGIA

Plants small, growing on wood, laterally sessile, tough, persistent, reviving when wet; margin regularly lobed; gills fold-like; spores white.

We have but one species which we insert from records by Schweinitz and Curtis, as we have not found it.

Trogia crispa Fr.

The following is from Murrill (N. Am. Flora, **9**: 164. 1910 (as Plicatura):

"Pilei crowded, subimbricate, usually sessile, persisting, reviving when moistened, 1-2 cm. broad; surface reddish-yellow or tan, paler toward the margin, often whitish-villose when young; margin beautifully lobed: context fleshy membranaceous, tough, thin, white; lamellæ white, narrow, vein-like, irregular, continuous or interrupted, sometimes branched, edges crisped, obtuse, white or bluish gray: spores cylindric, smooth, hyaline, 4 x 1μ:"

Rare on alder twigs, etc. Schw. (Syn. Car. No. 837.)

Middle and upper districts, dead wood and sticks (as *Cantharellus crispus*). Curtis.

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[2] Engler and Prantl, Pflanzenfamilien I: 554.
[3] Ibid. p. 555.
[4] Ibid. p. 131.

NYCTALIS

Plants growing on other mushrooms; small; cap mealy from the conidiospores; gills thick with blunt margins, or often fold-like or even aborted; veil not noticeable.

We have but one species.

Nyctalis asterophora Fr.

PLATES 2, 3 AND 16.

This remarkable plant is found occasionally growing in clusters on decaying plants of *Russula nigricans.* The caps are almost hemispheric and remain so at all ages, the margin strongly inrolled. They are up to about 3.8 cm. wide, white at first then grayish-buff and finally nearly buff, the surface tomentose-looking and soon becoming mealy from the loose coating of conidiospores that cover it.

Stem about 3-6 cm. long, and up to 6 mm. thick at top, tapering downward, white at first, then changing color more or less like the cap; usually crooked and irregular.

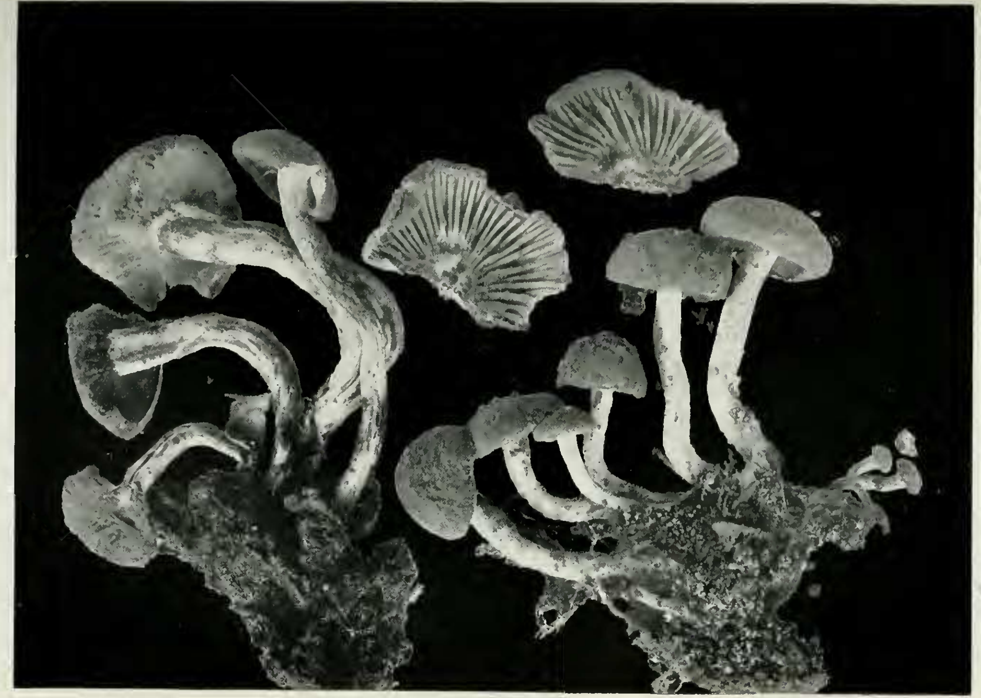
Gills very often aborted, when present they are thick, distant and narrow, with a blunt margin. Spores from the gills have been recorded, but usually seem to be suppressed, the reproduction depending on the conidiospores from the cap surface. These last are quite irregular in shape and size, usually longer than broad, more or less thickly covered with warty nodules, size about 14-19 x 18-26μ counting the warts. These conidiospores have been shown by Brefeld to be capable of reproducing the plant.

Illustrations: Mycologia **6**: Pl. 129. 1914.
Kauffman Agar. of Mich. **2**: Pl. 1. 1918.

1789. On a rotting *Russula nigricans.* pine grove at top of Lone Pine Hill, September 12, 1915. Photo and drawing of conidiospores.
2366. On rotting mushroom near Meeting of the Waters branch, by middle path, July 5, 1916. Photo.
2383. On dying *Russula nigricans.* base of Lone Pine Hill, June 28, 1916.

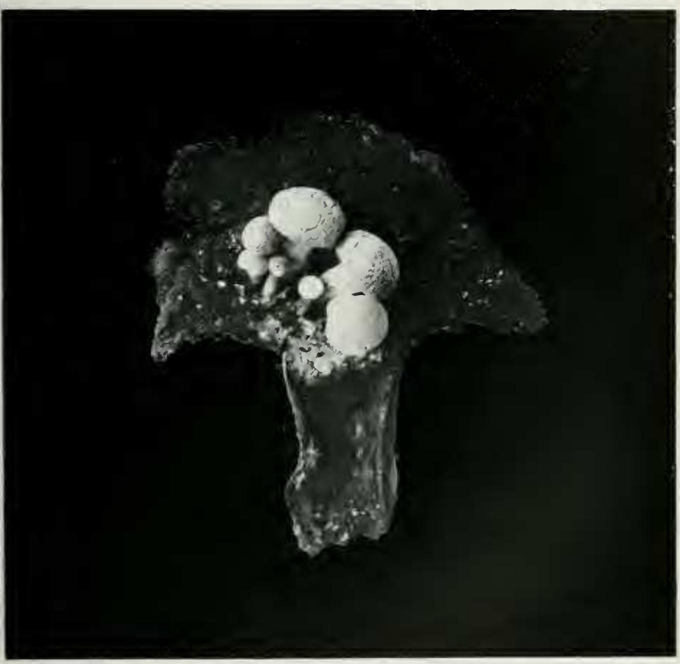
Asheville. Beardslee.
Middle and upper districts, on rotten agarics. Curtis.

PLATE 2



NYCTALIS ASTEROPHORA, No. 2366

PLATE 3



NYCTALIS ASTEROPHORA ON RUSSULA NIGRICANS, No. 1789

CRATERELLUS

Plants upright, fleshy, funnel shaped or rarely fan shaped, hymenium on outside, smooth or more often rugosely wrinkled at least towards the margin. The genus is to all appearances so closely related to *Cantharellus* that I do not think that we are justified in placing one genus in the *Thelophoraceæ* and the other in the *Agaricaceæ* as is practiced at present. So close is the relationship in fact that it is doubtful if the two genera can be logically separated. Some species, as the one I have treated here as *Cantharellus clavatus,* are so intermediate as to be placed in *Cantharellus* by some authors and in *Craterellus* by others. *Craterellus cantharellus* has not only the same shape and general appearance of *Cantharellus cibarius,* but also the same fragrance; while the spores of *Cantharellus aurantiacus* and *C. cinnabarinus* are pink like the spores of *Craterellus cantharellus.* If the folds of the hymenium are more or less distinct gills the species should be looked for in *Cantharellus,* if only wrinkled or rugose or smooth it should be found in *Craterellus.* As *Craterellus* is related on the one side to *Cantharellus,* so it approaches *Clavaria* on the other, and club shaped forms may be placed in either genus by different authors. These complicated relationships emphasize the impossibility of placing all related groups in juxtaposition in a lineal arrangement of genera. For full treatment of the genus see Burt, Ann. Mo. Bot. Garden **1**: 327. 1914. Also see Peck, N. Y. St. Mus. Bull. **2**: 44. 1887.

Key to the Species of Craterellus

Plant rosy on dorsal surface; hymenium and stem white .... *C. roseus* (3)
Plant entirely egg yellow.
  Stem solid .... *C. cantharellus* (1)
  Stem hollow .... *C. odoratus* (2)
Not entirely egg yellow or rosy.
  Plant tubular, with cavity to or near the base.
    Cap and stem drab when fresh, darker smoky-drab when old; pubescence at base of stem not buffy .... *C. cornucopoides* (4)
    Cap drying to leather color or snuff-brown, base with buffy pubescence.......................... *C. ochrosporus* (5)
  Plant less tubular, yellowish-brown to fuscous, 1.5-3 cm. wide, hymenium and stem yellow...... *C. lutescens* (6)
  Plant less than 1 cm. wide, hymenium creamy-buff .... *C. calyculus* (7)

1. **Craterellus cantharellus** Schw.

PLATES 4, 5 AND 16.

Plants medium to large, gregarious, often cespitose, firm and solid, growing in low woods and in swamps; not common. Cap up to 14 cm. wide, slightly or rather strongly depressed in center at maturity, the margin uplifted and arched, strongly sinuate or lobed; surface smooth, even, dry, about egg yellow. Flesh thick, firm, with the fragrance of *Cantharellus cibarius.*

Hymenium varying from quite smooth to distinctly rugose-wrinkled over most of the surface, the very margin nearly always slightly rugose at least, the wrinkles anastomosing; color distinctly salmon.

Stem up to about 6 cm. long, expanding upward into the cap, always bent, surface smooth, texture solid and quite firm.

Spores (of No. 1157) a distinct and pretty salmon pink, elliptic, smooth, 4-4.5 x 5-8μ*.

In Ann. Mo. Bot. Garden **1**: 330. 1914, Burt remarks:

"This species is so similar to *Cantharellus cibarius* in habit, coloration, size and form—differing from the latter only in the more even hymenium—that figures of *C. cibarius* will serve very well for *Craterellus Cantharellus*, if allowance is made for the different hymenium. The firm and solid stem of *C. Cantharellus* distinguishes this species from *C. odoratus* easily."

1157. Low grounds of New Hope Creek, about 200 yards below bridge on Durham road, July 18, 1914. Photo.

In this collection of many fine plants the largest was 12.5 cm. high and 14 cm. wide. The venation was confined to about 2 cm. of the margin except in the very largest plants and in no case did the veins extend to the stem (see photo).

1584. Same spot as No. 1157 and just like that collection only smaller, June 26, 1915. Spore surface almost smooth.

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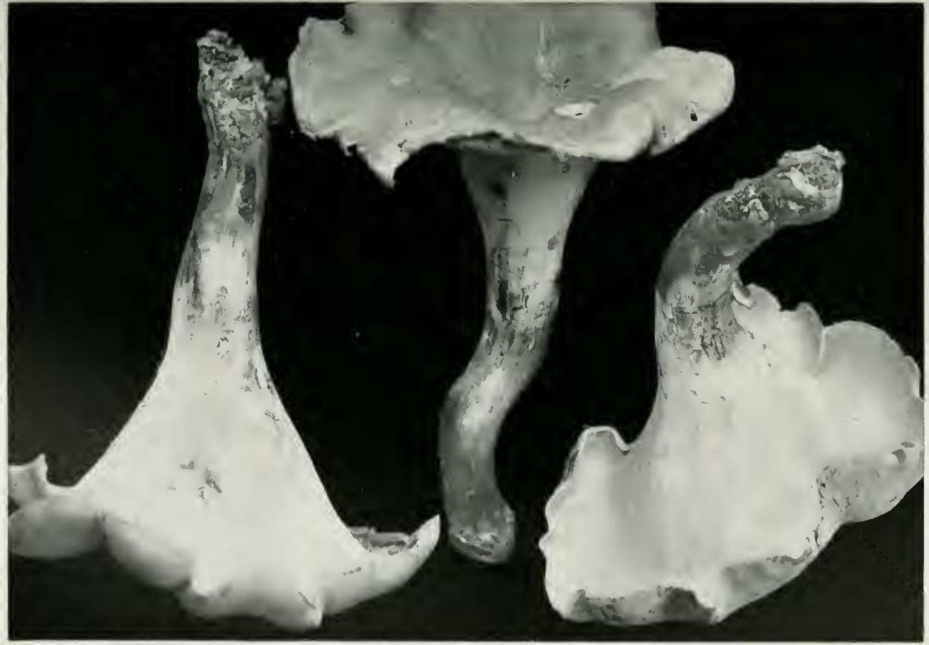
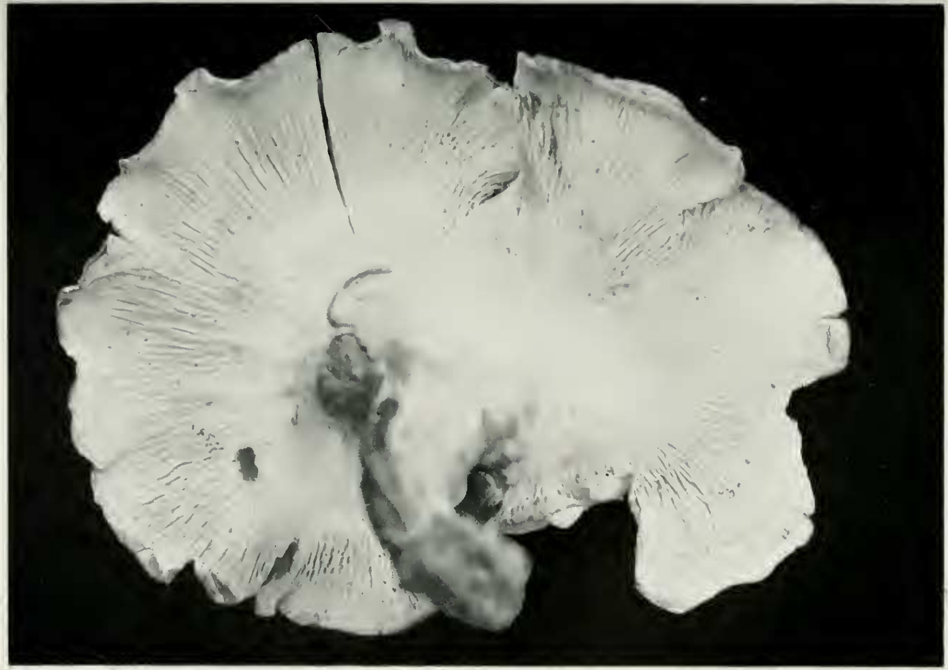
*In N. Y. St. Mus. Bull. 1, No. 2, p. 47, Peck says: "The spores . . . have a yellowish or salmon-yellow tint."

PLATE 4



CRATERELLUS CANTHARELLUS, No. 1157

PLATE 5



CRATERELLUS CANTHARELLUS, No. 1157

1600. Near branch west of Meeting of the Waters, not far from "Judge's Spring," July 13, 1915.

Blowing Rock. Atkinson.
Asheville. Beardslee.
North Carolina. Schweinitz.

2. **Craterellus odoratus** Schw.

Plates 6 and 16.

A peculiar plant with numerous small, funnel-shaped caps arising from a common solid stem; entire plant 5.5-7.5 cm. high, up to 7 cm. wide above; stem sometimes distinct, about 2 cm. long and 1.5 cm. thick, creamy white to ochraceous, glabrous, somewhat pitted and channeled, solid, firm, sometimes disappearing in a fused mass; flesh color of surface. Caps arising in all directions from the top of the stem, varying from very small up to 3.5 cm. long and 3 cm. wide, prettily trumpet-shaped, the margin crimped and wavy, narrowed below and hollow to the base, upper (inner) surface a beautiful chrome yellow (about deep chrome of Ridgway), finely *floccose-tomentose;* hymenium salmon-pink, quite smooth; flesh light yellow, about 1.3 mm. thick; taste and odor exactly that of *Cantharellus cibarius.*

Spores ochraceous-yellow, elliptic, smooth, many bent, 3.7-4.8 x 7.4-10.3μ.

I take our plant to be a much-branched form of *C. odoratus,* although other descriptions do not mention the floccose-tomentose surface. (See Burt, loc. cit., p. 331.)

Under the name of *Cantharellus odoratus* No. 1288, Curtis refers to this species in the Curtis-Berkeley Mss. as follows:

"Light yellow, very smooth, and destitute of plicæ, outer surface glaucous, 1-2 in. high, infundibuliform, hollow to the base of the stipe. Sporidia white. Sides of banks in woods."

2408. Mixed woods west of Meeting of the Waters, July 20, 1916. Photo.
2642. In path, low damp woods by branch back of athletic field, July 11, 1917.
2701. Rich woods, Battle's Park, July 16, 1917.
2761. Mixed woods north of cemetery, July 24, 1917. Photo.

Salem. Schweinitz.
Low and middle earth in woods. Curtis.

3. **Craterellus roseus** Fr.

This species is known only from the original collection by Schweinitz, probably near Salem. The description below is taken from Burt, (Ann. Mo. Bot. Garden **1**: 333. 1914):

"Fructifications solitary, somewhat fleshy; pileus infundibuliform, somewhat strigose, pallid rose, the margin lobed and inflexed; stem apparently stuffed, attenuated downward, white; hymenium somewhat rugose, white.

"In mosses, especially in proximity to *Kalmia*. North Carolina.

"Specimens of this species have the habit of *Cantharellus cibarius* but are thinner. Fries received a specimen of *Craterellus roseus* from Schweinitz and expressed the opinion in 'Elenchus' that the species is good. I have seen no specimens of *C. roseus* and base the above on the original description and the comments by Schweinitz and Fries."

4. **Craterellus cornucopioides** L.

PLATES 1 AND 16.

Plants up to 12 cm. tall and 5.5 cm. broad, shaped like a long cornucopia and hollow to the base, the margin broadly drooping or rarely plane, wavy, upper and inner surface squamulose-fibrous, most so near the margin, color exactly drab to light drab of Ridgway, blackening on drying. Flesh very thin, tough and elastic, color of surface, odor distinctly musty-fragrant, faintly like that of *Cantharellus cibarius,* taste slight, similar.

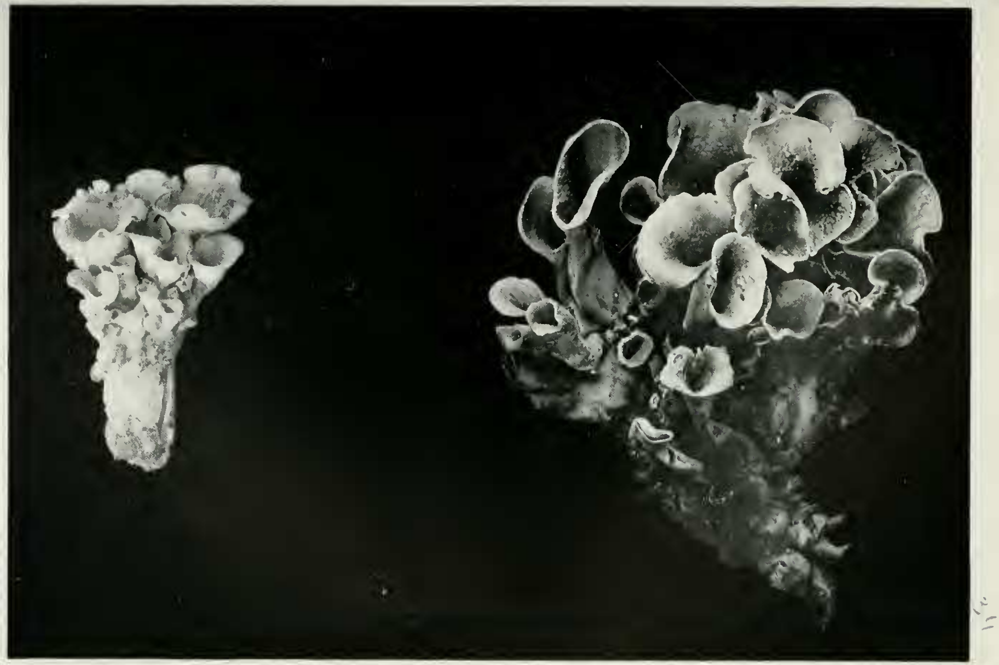
Spore surface glaucous, fleshy-drab color, not at all veined, but somewhat channeled and pitted or quite smooth in places, extending half way down the stem, or farther.

Stem fading into the cap, grayish drab, the base lighter and tomentose, not ochraceous below the hymenium, hollowed to the base, usually bent and pinched.

Spores a distinct salmon-pink color, elliptic, smooth, some bent, 5.9-7.4 x 10.8-13μ.

When rubbed and in age all parts become darker and sometimes quite black in places, but when perfectly fresh the colors are lighter than usually described. Descriptions of the spores as white or hya-

PLATE 6



CRATERELLUS ODORATUS, No. 2408 (left), No. 2761 (right)

line must have been made from old prints after the spores had faded, as they are distinctly a clear salmon-pink when at all fresh.

2195. Mixed woods, pasture near Mr. Pritchard's, June 22, 1916. Photo.
2536. In moss in damp woods back of athletic field, June 20, 1917.
3261. In moist, shady place among moss and liverworts in cemetery, May 30, 1909. Painting.

Asheville. Beardslee.
North Carolina. Schweinitz.

5. **Craterellus ochrosporus** Burt.

Plants 3-4 cm. high, stalk 2-2.5 cm. long, smooth, and black except at base which is covered with a minute creamy-buff tomentum; hollow to base; above it expands rather suddenly to the funnel-shaped cap about 1-1.5 cm. wide, which is brown and rough squamulose on the upper (inner) surface. The hymenium (outer surface) is smooth and a buffy flesh color. Texture fleshy, but toughish and flexible.

Spores smooth, elliptic, 7.4-10 x 11-14.4μ. They are said to be straw-yellow but we did not get a heavy enough print to determine this point.

I have followed Burt in recognizing this species, but without conviction that it is distinct from the preceding.

1959. On a mossy bank by branch below Strowd's spring, November 3, 1915.

6. **Craterellus lutescenes** Pers.

This has not yet been found in Chapel Hill and the following is from Burt (Ann. Mo. Bot. Garden **1**: 336, 1914):

"Fructifications solitary to cespitose; pileus thin, somewhat membraneaceous, varying from convex and umbilicate to tubiform or funnel-shaped, often pervious, yellowish brown to fuscous, with margin often lobed or irregular; stem flexuous, cylindric, hollow, yellow, drying ochraceous buff, often hairy at the base; hymenium remotely ribbed, even or rugose-wrinkled, yellow, drying cadmium-yellow to ochraceous buff; spores even, 10-12 x 6-8μ.

"Fructifications 2½-5 cm. high; pileus 1½-3 cm. broad, stem 1½-4 cm. long, 2-4 mm. thick.

"On moist ground in woods and swamps. Newfoundland to North Carolina and westward to Michigan. August to October.

"This species probably ranks next to *C. cornucopioides* in frequency in the United States. The long and yellow stem readily distinguishes this species from *C. ochrosporous.* Specimens of *Cantharellus infundibuliformis* resemble those of *Craterellus lutescens* in form, size, and color, but those of the former species have true lamellæ."

Blowing Rock, Atkinson.
North Carolina. Schweinitz.
Low district, earth and woods. Curtis.

7. **Craterellus calyculus** (B. and C.) Burt.

Not yet found in Chapel Hill and known only from North Carolina and South Carolina. The following is from Burt (Ann. Mo. Bot. Garden **1**: 338. 1914):

"Fructifications somewhat fleshy-membranaceous; pileus thin, deeply cup-shaped, minutely tomentose, drying Saccardo's umber, opaque; stem apparently hollow, cream buff, attenuated below, tomentose at the base; hymenium even or slightly venose, cream buff; spores slightly yellowish under the microscope, even, 8 x 6μ.

"Fructifications 2-3 cm. high; pileus 4-8 mm. broad; stem 1 cm. long, 1-2 mm. thick.

"On ground in damp shady woods. North and South Carolina. August and September.

"Upon moistening, the type in Kew Herbarium proved too soft and fleshy and the hymenium too waxy for a *Stereum.* The sections have the structure of *Craterellus.* The species is near *C. sinuosus* and may prove to be a small form of this when ample material gives more complete knowledge of the species, but, for the present, I regard *C. calyculus* as a distinct species. I refer to *C. calyculus* a collection made by Professor Atkinson at Blowing Rock, North Carolina, the rough-dried and cespitose specimens of which show a somewhat tubiform pileus and spores. 7-8 x 4½μ."

Blowing Rock. Atkinson.
Low district, moist woods. Curtis.

CANTHARELLUS

Plants fleshy, growing on the ground or (in one case) on wood, stem central or laterally attached in one species, gills fold-like or somewhat thin and approaching those of a Hygrophorus with an obtuse edge, cap usually depressed in center, sometimes infundibuliform; spores buff or ochraceous or rosy pink or light salmon.*

Important literature:

Murrill, N. Am. Flora **9**: 167. 1910.
Peck, N. Y. State Cab. Rep. **23**: 121. 1872.
Peck, N. Y. State Mus. Bul. **2**: 34. 1887.

Key to the Species of Cantharellus

Stalk none or lateral, growing from the stems of living mosses.	
Plant with a lateral stalk; cap glabrous	*C. muscigenus* (2)
Plant sessile, cap finely downy	*C. retirugus* (1)
Stalk central, not growing on mosses.	
Growing on rotting logs	*C. lignatilis* (12)
Growing on ground.	
Cap pallid brown, gills ashy vinaceous	*C. infundibuliformis* (3)
Cap grayish-drab, black when bruised, odor very musky	*C. sinuosus* (4)
Cap grayish-brown, gills white or creamy	*C. umbonatus* (11)
Cap buffy-brown with lilac tint, flesh lilac	*C. clavatus* (8)
Entire plant cinnabar red or cap red and gills orange	*C. cinnabarinus* (9)
Cap some shade of yellow or orange.	
Cap deeply infundibuliform, stem hollow.	
Plants thin, small, less than 5 cm. broad	*C. infundibuliformis* (3)
Plants larger, over 5 cm. broad	*C. floccosus* (5)
Cap flat or only depressed, stem solid.	
Cap and gills orange.	
Gills distant	*C. cinnabarinus, orange form* (9), *and C. minor* (10)
Gills close	*C. aurantiacus* (7)
Cap and gills yellow or creamy	*C. cibarius* (6)

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*Most authors speak of the spores as white for the genus, but this is not the case with our Chapel Hill plants. In all of our species so far collected the spores have been distinctly colored, when fresh. The color gradually fades in the herbarium. Beardslee writes me that the spores of Asheville plants show similar colors.

1. **Cantharellus retirugus** (Bull.) Fr.

Dictyolus retirugus in N. Am. Fl. **9** : 166.

PLATES 7 AND 16.

Cap up to 1 cm. broad (said to reach 2 cm.) quite sessile by the dorsal surface, often hanging from center, but usually eccentric or almost laterally seated at times, bell or shell-shaped when young, then more expanded to saucer-shaped or broadly petalloid; very thin and delicate, nearly pure white and finely downy when young, so that the incurved margin is delicately fimbriate, at maturity the down collapses and the surface fibers split and separate like the surface of a cocoon.

Gills very rudimentary, composed of irregular folds or veins in center which may branch and deliquesce quite irregularly, fading away before the margin is reached, or the surface may seem merely pitted (as in Auricularia) rather than veined, and often is almost smooth; when young the hymenium is nearly white, then pale ashy straw, the upper surface making the same change or remaining more whitish.

Spores (of No. 3224) pure white, smooth, subelliptic to pip-shaped, 4-4.5 x 6.6-8.5μ.

The place of attachment is usually a mm. or more wide, the surface fibers disappearing into the moss. So exceedingly delicate is the plant that it dries up to an earth gray or darker crumpled particle so inconspicuous as to be found with difficulty even on preserved material where it is known to be plentiful. It breaks easily from the moss when dry and revives very little when moistened.

This is certainly *C. retirugus* and not *C. muscigenus.* Bulliard's figure (Pl. 498, fig. 1) represent our plants exactly. It has not been reported heretofore south of our most northern states and ranges northward to Alaska and Greenland. Schweinitz reports *C. muscigenus* from North Carolina, but not this species. We have not found the former.

3224. Parasitic on a moss, bank by road east of campus. Jan. 27, 1919. Photo. Plentiful.